Bottom Ash Data

2022 Week 11

The following analytical report represents bottom ash composite results for week 11 of 2022 (March 13, 2022 to March 19, 2022).

The bottom ash meets the conditions of Metro Vancouver's 2020 Bottom Ash Management Plan and is suitable for disposal.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A5866**	Page	: 1 of 11
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 22-Mar-2022 10:40
PO	: VANCO 0000051213	Date Analysis Commenced	: 02-Apr-2022
C-O-C number	: ----	Issue Date	: 06-Apr-2022 12:02
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2211-A-1	BA2211-A-2	BA2211-A-3	BA2211-A-4	BA2211-A-5
					Client sampling date / time	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00
						VA22A5866-001	VA22A5866-002	VA22A5866-003	VA22A5866-004	VA22A5866-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		20.4	20.6	19.3	22.3	22.3
pH (1:2 soil:water)	----	E108	0.10	pH units		11.2	11.4	11.6	11.5	11.4
Metals										
aluminum	7429-90-5	E440	50	mg/kg		36200	34100	37100	32500	30200
antimony	7440-36-0	E440	0.10	mg/kg		112	106	104	109	109
arsenic	7440-38-2	E440	0.10	mg/kg		21.3	25.4	21.8	26.7	51.6
barium	7440-39-3	E440	0.50	mg/kg		480	484	487	455	463
beryllium	7440-41-7	E440	0.10	mg/kg		0.37	0.37	0.36	0.37	0.32
bismuth	7440-69-9	E440	0.20	mg/kg		5.56	7.05	6.72	5.90	6.61
boron	7440-42-8	E440	5.0	mg/kg		270	182	204	206	284
cadmium	7440-43-9	E440	0.020	mg/kg		9.80	9.91	9.23	14.2	10.7
calcium	7440-70-2	E440	50	mg/kg		141000	148000	140000	147000	147000
chromium	7440-47-3	E440	0.50	mg/kg		133	195	155	1240	146
cobalt	7440-48-4	E440	0.10	mg/kg		150	462	73.7	359	59.4
copper	7440-50-8	E440	0.50	mg/kg		3390	3090	5030	1820	1800
iron	7439-89-6	E440	50	mg/kg		62400	62000	51200	89800	54800
lead	7439-92-1	E440	0.50	mg/kg		1080	436	364	639	402
lithium	7439-93-2	E440	2.0	mg/kg		22.9	22.7	20.8	19.9	19.5
magnesium	7439-95-4	E440	20	mg/kg		12900	12400	12000	12600	11400
manganese	7439-96-5	E440	1.0	mg/kg		775	937	794	1020	787
mercury	7439-97-6	E510	0.0500	mg/kg		0.0602	<0.0500	<0.0500	0.0504	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg		29.8	28.7	27.8	47.2	34.9
nickel	7440-02-0	E440	0.50	mg/kg		135	198	264	1090	133
phosphorus	7723-14-0	E440	50	mg/kg		11600	12100	11600	11600	11400
potassium	7440-09-7	E440	100	mg/kg		4430	4610	4440	4560	3840
selenium	7782-49-2	E440	0.20	mg/kg		0.28	0.39	0.38	0.31	0.37
silver	7440-22-4	E440	0.10	mg/kg		4.05	18.6	6.32	4.01	4.55
sodium	7440-23-5	E440	50	mg/kg		14100	14300	14800	15100	13400
strontium	7440-24-6	E440	0.50	mg/kg		368	461	333	340	343
sulfur	7704-34-9	E440	1000	mg/kg		11600	11900	11600	11900	12100

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2211-A-1	BA2211-A-2	BA2211-A-3	BA2211-A-4	BA2211-A-5
					Client sampling date / time	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00
						VA22A5866-001	VA22A5866-002	VA22A5866-003	VA22A5866-004	VA22A5866-005
						Result	Result	Result	Result	Result
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		0.051	0.057	0.051	<0.050	0.058
tin	7440-31-5	E440	2.0	mg/kg		105	646	335	164	98.3
titanium	7440-32-6	E440	1.0	mg/kg		792	982	921	726	620
tungsten	7440-33-7	E440	0.50	mg/kg		15.3	19.7	14.2	13.7	13.2
uranium	7440-61-1	E440	0.050	mg/kg		5.40	6.07	5.64	6.00	6.16
vanadium	7440-62-2	E440	0.20	mg/kg		53.6	52.4	50.7	53.5	48.0
zinc	7440-66-6	E440	2.0	mg/kg		5180	3850	4510	3430	5210
zirconium	7440-67-7	E440	1.0	mg/kg		1.6	1.7	1.8	1.7	1.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.6	11.8	11.6	11.6	11.7
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.88	7.11	7.97	7.62	8.80
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.92	2.92	2.92	2.92	2.92
pH, TCLP final	----	EPP444	0.010	pH units		6.11	6.00	6.11	6.17	6.23
antimony, TCLP	7440-36-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L		2.00	2.00	1.91	2.03	1.92
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.136	0.147	0.149	0.141	0.117
calcium, TCLP	7440-70-2	E444	10	mg/L		1980	2120	2110	2230	1990
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.861	1.56	0.822	1.25	0.898
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.45	0.950	0.714	1.63	0.688
iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		128	133	141	145	134
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.44	0.62	0.51	0.49	0.42
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2211-A-1	BA2211-A-2	BA2211-A-3	BA2211-A-4	BA2211-A-5
					Client sampling date / time	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00
						VA22A5866-001	VA22A5866-002	VA22A5866-003	VA22A5866-004	VA22A5866-005
						Result	Result	Result	Result	Result
TCLP Metals										
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L		46.0	40.4	38.5	31.2	28.4
zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	<10	<10	<10	<10

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2211-A-6	BA2211-A-7	BA2211-A-8	BA2211-A-9	BA2211-A-10
					Client sampling date / time	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00
						VA22A5866-006	VA22A5866-007	VA22A5866-008	VA22A5866-009	VA22A5866-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		22.5	21.6	21.0	21.9	22.1
pH (1:2 soil:water)	----	E108	0.10	pH units		11.4	11.4	11.3	11.4	11.4
Metals										
aluminum	7429-90-5	E440	50	mg/kg		35500	32100	36000	33700	32300
antimony	7440-36-0	E440	0.10	mg/kg		142	124	140	117	154
arsenic	7440-38-2	E440	0.10	mg/kg		22.0	23.8	25.9	20.9	39.9
barium	7440-39-3	E440	0.50	mg/kg		471	463	479	504	466
beryllium	7440-41-7	E440	0.10	mg/kg		0.35	0.34	0.37	0.38	0.36
bismuth	7440-69-9	E440	0.20	mg/kg		6.55	6.35	7.29	6.54	13.4
boron	7440-42-8	E440	5.0	mg/kg		239	186	163	237	173
cadmium	7440-43-9	E440	0.020	mg/kg		12.8	10.3	11.2	11.2	9.20
calcium	7440-70-2	E440	50	mg/kg		148000	151000	150000	139000	145000
chromium	7440-47-3	E440	0.50	mg/kg		206	180	243	126	140
cobalt	7440-48-4	E440	0.10	mg/kg		52.4	49.2	59.4	59.8	79.7
copper	7440-50-8	E440	0.50	mg/kg		6840	19400	7970	4000	10800
iron	7439-89-6	E440	50	mg/kg		64000	63900	66900	55800	57400
lead	7439-92-1	E440	0.50	mg/kg		2320	407	1010	380	1290
lithium	7439-93-2	E440	2.0	mg/kg		21.9	20.2	21.8	19.1	20.8
magnesium	7439-95-4	E440	20	mg/kg		12200	13600	12200	12100	12100
manganese	7439-96-5	E440	1.0	mg/kg		912	853	950	952	759
mercury	7439-97-6	E510	0.0500	mg/kg		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg		42.7	27.3	40.0	27.7	35.2
nickel	7440-02-0	E440	0.50	mg/kg		302	325	186	101	664
phosphorus	7723-14-0	E440	50	mg/kg		11900	12000	13700	11300	11300
potassium	7440-09-7	E440	100	mg/kg		4510	4320	4550	4450	4520
selenium	7782-49-2	E440	0.20	mg/kg		0.32	0.41	0.36	0.39	0.32
silver	7440-22-4	E440	0.10	mg/kg		4.39	8.49	5.72	4.39	7.33
sodium	7440-23-5	E440	50	mg/kg		14900	13900	14300	14300	15300
strontium	7440-24-6	E440	0.50	mg/kg		367	342	343	354	342
sulfur	7704-34-9	E440	1000	mg/kg		12000	13400	13300	11500	12600
thallium	7440-28-0	E440	0.050	mg/kg		0.074	0.058	0.070	<0.050	0.051

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2211-A-6	BA2211-A-7	BA2211-A-8	BA2211-A-9	BA2211-A-10
					Client sampling date / time	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00
						VA22A5866-006	VA22A5866-007	VA22A5866-008	VA22A5866-009	VA22A5866-010
						Result	Result	Result	Result	Result
Metals										
tin	7440-31-5	E440	2.0	mg/kg		368	152	123	314	186
titanium	7440-32-6	E440	1.0	mg/kg		874	901	803	946	863
tungsten	7440-33-7	E440	0.50	mg/kg		15.7	14.4	18.0	12.8	17.6
uranium	7440-61-1	E440	0.050	mg/kg		6.02	6.33	6.50	5.60	6.20
vanadium	7440-62-2	E440	0.20	mg/kg		50.0	50.5	56.5	48.6	58.3
zinc	7440-66-6	E440	2.0	mg/kg		12600	10300	3630	3820	6480
zirconium	7440-67-7	E440	1.0	mg/kg		1.7	1.6	1.7	1.6	1.7
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.7	11.7	11.7	11.7	11.8
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.41	8.75	8.77	8.60	9.44
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.92	2.92	2.92	2.92	2.92
pH, TCLP final	----	EPP444	0.010	pH units		6.01	6.07	6.10	6.15	6.07
antimony, TCLP	7440-36-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L		1.96	1.94	2.06	2.44	2.05
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.140	0.139	0.370	0.146	0.218
calcium, TCLP	7440-70-2	E444	10	mg/L		2110	2210	2230	2030	2090
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.918	1.06	0.759	2.26	0.887
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.59	0.922	0.808	1.26	0.623
iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		135	134	138	134	137
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.61	0.88	0.74	0.58	0.40
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2211-A-6	BA2211-A-7	BA2211-A-8	BA2211-A-9	BA2211-A-10
					Client sampling date / time	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00	16-Mar-2022 09:00
						VA22A5866-006	VA22A5866-007	VA22A5866-008	VA22A5866-009	VA22A5866-010
						Result	Result	Result	Result	Result
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L		44.0	44.7	30.9	29.9	24.7
zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	<10	<10	<10	<10

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: BA2211-A-11	BA2211-A-12	----	----	----
					Client sampling date / time: 16-Mar-2022 09:00	16-Mar-2022 09:00	----	----	----
					VA22A5866-011	VA22A5866-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
moisture	----	E144	0.25	%	18.9	19.9	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	11.4	----	----	----
Metals									
aluminum	7429-90-5	E440	50	mg/kg	32800	30100	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	127	105	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	25.4	24.5	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	492	436	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.38	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	7.96	72.8	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	196	172	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	12.3	11.4	----	----	----
calcium	7440-70-2	E440	50	mg/kg	148000	154000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	148	125	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	69.0	51.0	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	6320	5840	----	----	----
iron	7439-89-6	E440	50	mg/kg	62400	55800	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	448	667	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	18.5	24.1	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	14100	12800	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	819	4920	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	28.4	21.8	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	118	188	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	11700	14700	----	----	----
potassium	7440-09-7	E440	100	mg/kg	4630	4560	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.34	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	4.46	4.50	----	----	----
sodium	7440-23-5	E440	50	mg/kg	15300	14100	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	369	293	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	12500	12700	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	0.050	0.054	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2211-A-11	BA2211-A-12	----	----	----
					Client sampling date / time	16-Mar-2022 09:00	16-Mar-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22A5866-011	VA22A5866-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
tin	7440-31-5	E440	2.0	mg/kg		158	95.7	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg		780	509	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg		14.8	16.3	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg		6.15	6.78	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg		52.8	55.1	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg		3350	4630	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg		1.4	1.6	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.7	11.7	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		9.33	8.99	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.92	2.92	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		6.20	6.00	----	----	----
antimony, TCLP	7440-36-0	E444	1.0	mg/L		<1.0	<1.0	----	----	----
arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	----	----	----
barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	----	----	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	----	----	----
boron, TCLP	7440-42-8	E444	0.50	mg/L		1.95	1.98	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.143	0.158	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L		2120	2080	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.849	1.45	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.969	0.973	----	----	----
iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	----	----	----
lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	<0.25	----	----	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		131	131	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.46	0.64	----	----	----
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	----	----	----
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	----	----	----
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	----	----	----
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2211-A-11	BA2211-A-12	----	----	----
					Client sampling date / time	16-Mar-2022 09:00	16-Mar-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22A5866-011	VA22A5866-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	----	----	----
zinc, TCLP	7440-66-6	E444	0.50	mg/L		26.2	68.7	----	----	----
zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	<10	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A5866**	Page	: 1 of 16
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 22-Mar-2022 10:40
PO	: VANCO 0000051213	Issue Date	: 06-Apr-2022 12:02
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA22A5866-001	BA2211-A-1	cobalt	7440-48-4	E440	33.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A5866-001	BA2211-A-1	lead	7439-92-1	E440	43.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A5866-001	BA2211-A-1	silver	7440-22-4	E440	46.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-448915002	----	strontium	7440-24-6	E440	122 % MES	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-1	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-10	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-11	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-12	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-2	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-3	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-4	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-5	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-6	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-7	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-8	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2211-A-9	E510	16-Mar-2022	05-Apr-2022	----	----		06-Apr-2022	28 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-1	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-10	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-11	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-12	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-2	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-3	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-4	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-5	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-6	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-7	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-8	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2211-A-9	E440	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	20 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-1	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-10	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-11	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-12	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-2	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-3	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-4	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-5	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-6	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-7	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-8	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2211-A-9	E144	16-Mar-2022	----	----	----		02-Apr-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-1	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-10	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-11	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-12	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-2	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-3	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-4	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-5	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-6	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-7	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-8	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2211-A-9	E108	16-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	30 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-1	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-10	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-11	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-12	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-2	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-3	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-4	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-5	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-6	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-7	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-8	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2211-A-9	E512	02-Apr-2022	----	----	----		05-Apr-2022	28 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-1	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-10	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-11	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-12	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-2	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-3	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-4	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-5	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-6	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-7	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-8	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2211-A-9	E444	02-Apr-2022	----	----	----		05-Apr-2022	180 days	20 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-1	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-10	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-11	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-12	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-2	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-3	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-4	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-5	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-6	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-7	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-8	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2211-A-9	EPP444	16-Mar-2022	02-Apr-2022	----	----		----	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	448916	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	448915	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	448920	1	18	5.5	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	448917	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	448916	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	448915	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	448920	1	18	5.5	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	448917	1	12	8.3	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	450853	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	448916	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	450854	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	448915	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	448920	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	450853	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	450854	1	12	8.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 ºC) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: **VA22A5866**	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 22-Mar-2022 10:40
PO	: VANCO 0000051213	Date Analysis Commenced	: 02-Apr-2022
C-O-C number	: ----	Issue Date	: 06-Apr-2022 12:02
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 448917)											
VA22A5866-001	BA2211-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.3	0.9%	5%	----
Physical Tests (QC Lot: 448920)											
VA22A5866-001	BA2211-A-1	moisture	----	E144	0.25	%	20.4	19.8	3.10%	20%	----
Metals (QC Lot: 448915)											
VA22A5866-001	BA2211-A-1	aluminum	7429-90-5	E440	50	mg/kg	36200	33800	7.02%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	112	113	1.46%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	21.3	23.6	9.94%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	480	445	7.66%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.43	0.05	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	5.56	6.60	17.0%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	270	232	15.0%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	9.80	11.3	14.5%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	141000	139000	1.02%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	133	138	3.26%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	150	211	33.9%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	3390	4420	26.4%	30%	----
		iron	7439-89-6	E440	50	mg/kg	62400	57800	7.78%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	1080	698	43.0%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	22.9	22.6	1.30%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12900	12700	1.78%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	775	987	24.1%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	29.8	22.8	26.4%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	135	139	2.63%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	11600	12800	10.4%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4430	4970	11.5%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.29	0.02	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	4.05	6.50	46.5%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	14100	15100	7.06%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	368	345	6.44%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	11600	12300	5.78%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.051	0.054	0.003	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 448915) - continued											
VA22A5866-001	BA2211-A-1	tin	7440-31-5	E440	2.0	mg/kg	105	127	19.3%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	792	688	14.0%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	15.3	16.5	7.64%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	5.40	5.92	9.15%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	53.6	51.8	3.49%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	5180	4960	4.41%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.5	0.2	Diff <2x LOR	----
Metals (QC Lot: 448916)											
VA22A5866-001	BA2211-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.0602	<0.0500	0.0102	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 448920)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 448915)						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 448915) - continued						
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 448916)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 450853)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 450854)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 448917)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Physical Tests (QCLot: 448920)									
moisture	----	E144	0.25	%	50 %	93.6	90.0	110	----
Metals (QCLot: 448915)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	111	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	119	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	108	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	100	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	111	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	108	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	107	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	104	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	98.8	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	114	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	106	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	116	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	108	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	111	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	107	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	110	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	# 122	80.0	120	MES
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	110	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	109	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	105	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 448915) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	109	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	117	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	112	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	107	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	118	80.0	120	----
Metals (QCLot: 448916)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	106	80.0	120	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 450853)										
VA22A5866-001	BA2211-A-1	mercury, TCLP	7439-97-6	E512	0.0008 mg/L	0.001 mg/L	85.8	50.0	140	----
TCLP Metals (QCLot: 450854)										
VA22A5866-001	BA2211-A-1	antimony, TCLP	7440-36-0	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	99.5	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.1 mg/L	12.5 mg/L	104	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.227 mg/L	0.25 mg/L	90.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.76 mg/L	10 mg/L	97.6	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.252 mg/L	0.25 mg/L	101	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.23 mg/L	1.25 mg/L	98.6	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.42 mg/L	2.5 mg/L	96.8	50.0	140	----
		iron, TCLP	7439-89-6	E444	235 mg/L	250 mg/L	94.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.97 mg/L	10 mg/L	89.7	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	294 mg/L	250 mg/L	118	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.45 mg/L	2.5 mg/L	97.8	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.78 mg/L	5 mg/L	95.7	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.102 mg/L	0.1 mg/L	102	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	91.5	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.92 mg/L	5 mg/L	98.4	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	102	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	8 mg/L	10 mg/L	79.1	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix: **Soil/Solid**

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 448915)									
QC-448915-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	94.5	70.0	130	----
QC-448915-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	103	70.0	130	----
QC-448915-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	101	70.0	130	----
QC-448915-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	94.4	70.0	130	----
QC-448915-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	94.4	70.0	130	----
QC-448915-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	92.1	40.0	160	----
QC-448915-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	111	70.0	130	----
QC-448915-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	104	70.0	130	----
QC-448915-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	92.2	70.0	130	----
QC-448915-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	98.9	70.0	130	----
QC-448915-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
QC-448915-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	96.3	70.0	130	----
QC-448915-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	96.4	70.0	130	----
QC-448915-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	93.5	70.0	130	----
QC-448915-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	102	70.0	130	----
QC-448915-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	96.9	70.0	130	----
QC-448915-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
QC-448915-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	102	70.0	130	----
QC-448915-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	99.0	70.0	130	----
QC-448915-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	91.5	70.0	130	----
QC-448915-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	92.2	70.0	130	----
QC-448915-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	----
QC-448915-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	94.6	40.0	160	----
QC-448915-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	99.3	70.0	130	----
QC-448915-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	88.9	70.0	130	----
QC-448915-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	98.7	70.0	130	----
QC-448915-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	97.8	70.0	130	----
QC-448915-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	96.6	70.0	130	----
QC-448915-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	86.0	70.0	130	----

Sub-Matrix: **Soil/Solid**

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 448916)									
QC-448916-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	110	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page ____ of ____

Report To				Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy			☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Steve Mckinney / Dan Skrypnyk			☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive			Email 1:	smckinney@covanta.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC			Email 2:	rjohnson4@covanta.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com	**Analysis Request**
		☐ Yes	☐ No		brent.kirkpatrick@metrovancouver.org	
					Sarah.Wellman@metrovancouver.org	
Invoice To	Same as Report ?			**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:		
Company:				PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite	
Contact:				LSD:	(includes 2:1 pH)	
Address:						
Phone:		Fax:		Quote #:		
Lab Work Order # (lab use only)		5866		ALS Contact:		Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
	BA2211-A-1	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-2	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-3	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-4	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-5	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-6	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-7	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-8	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-9	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-10	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-11	16-Mar-22	9:00	Soil	X	X		X	1
	BA2211-A-12	16-Mar-22	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA22A5866

Telephone : +1 604 253 4188

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	22-Mar-22	0800				18.1 °C	JW	10:40 am	Mar.22	

GENF 20.00 Front